TRANSITION EDGE $YBa_2Cu_3O_{7-x}$ MICROBOLOMETERS FOR INFRARED STARING ARRAYS

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A potentially important application of high-temperature superconducting microbolometers is infrared staring arrays. In many such staring arrays, sensitivity is more important than speed of response. "1'bus, it is desirable to design low-thermal-mass pixels that arc thermally isolated from the substrate. To this end, Johnson, et al.[1] at Honeywell have fabricated meander lines of $YBa_2Cu_3O_{7-x}$ (YBCO) sandwiched between layers of Si_3N_4 (SN). The silicon was etched out from under each YBCO meander line to form low-thermal-mass, thermally isolated microbolometers. These devices showed responsivities up to 60 kV/W with a 16 μA bias, and a noise equivalent power of 9×10^{-13} W/Hz$^{1/2}$ at 7 Hz with a 5 μA bias (neglecting contact noise). A drawback of the Honeywell design is that the YBCO is grown on a SN underlayer, which precludes the possibility of epitaxial YBCO growth. The YBCO therefore has a broad resistive transition, which limits the bolometer sensitivity, and the grain boundaries create excess noise. Wc arc improving the 1 loneywell microbolometer design by using epitaxial YBCO grown on a YSZ buffer layer that is epitaxial with the uncle.rlying silicon. The YSZ thus serves as the lower layer of the membranc structure and protects the underside of the YBCO meander line from the final etching solution.

[1] B.R. Johnson, T. Ohnstein, C.J. Han, R. Higashi, P.W. Kruse, R.A. Wood, 11. Marsh, and S.B. Dunham, IEEE Trans. Appl. Supercond. **3**, 2856 (1993).

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